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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/561,650

03/07/2007

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60680-2089

7669

10291 7590 12/15/2009  
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EXAMINER

YOON, TAE H

ART UNIT

PAPER NUMBER

1796

MAIL DATE

DELIVERY MODE

12/15/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.



Art Unit: 1796

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 37-64 and 66-71 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites "wherein the polymer-based bearing material is adhered directly to the substrate by the adhesive properties of the matrix material", but the plain bearing of claim 1 includes a layer of a metallic bearing material between the substrate and the polymer-based bearing material. Thus, the polymer-based bearing material cannot be adhered directly to the substrate, and claims are confusing and indefinite.

The recited fluoropolymer as an addition in claims 54 and 55 is improper and confusing since the amended claim recites said fluoropolymer as a mandatory component. Also, "at least one addition" in claims 54 and 55 lacks antecedent basis in claim 1 and it is indefinite.

The recited "at least one addition" in claims 57, 58, 61, 62 lacks antecedent basis in claim 1 and it is indefinite. Also, "the at least one addition does not exceed 35 vol%" in claim 61 is confusing and indefinite since said "at least one addition" encompasses "one addition" and the highest amount of said one addition (either ceramic powder or the silica) is 20vol% in claim 1. A similar reasoning is applied to claim 62.

The recited "second bearing material (such as copper alloy)" in claims 65 and 66 is confusing and indefinite since claim 1 recites "a polymer-based bearing material" and

Art Unit: 1796

the polymer-based bearing material is adhered directly to the substrate by the adhesive properties of the matrix material”.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 41-44, 49-54, 56, 57, 59-62, 66, 68, 70 and 71 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Berlinghof, Jr. (US 3,342,667).

Berlinghof, Jr. teaches a bearing material utilizing a phenol-modified epoxy resin and a mixture of metal powders, fluoropolymer (PTFE) particles and solid lubricant (ceramic powders) in Fig. 2, examples and claims. Detailed teaching of such fillers is taught at col. 3. See *Atlas powder v. IRECO*, 51 USPQ 2d, 1943 (or 190 F.3d 1342, 1346) (Fed. Cir. 1999), any single prior art reference that falls within each of the ranges anticipates the claim (overlapping ranges).

The modified epoxy resin of epichlorohydrin and bisphenol A is seen in example 1. Various substrates such as metal are also taught at col. 4, line 24 and bonded bearing in claim 5. Optional limitations do not need to be taught by Berlinghof, Jr.

With respect to claims 70 and 71, an invention in a product-by-process is a product, not a process. See **In re Brown**, 459 F2d 531, 173 USPQ 685 (CCPA 1972) and **In re Thorpe**, 777 F2d 695, 697, 227 USPQ 964 (Fed. Cir. 1985).

Thus, the invention lacks novelty.

Claims 1, 37, 38, 41-44, 49-54, 56, 57, 59-62 and 66-71 are rejected under 35 U.S.C. 103(a) as obvious over Berlinghof, Jr. (US 3,342,667) with or without teaching of DE 2917856 or Okado et al (US 2003/0134141 A1).

The instant invention further recites a ratio of the epoxy resin and phenolic resin, amino resin (crosslinker) and thickness of a polymer-based bearing material over Berlinghof, Jr.

However, Berlinghof, Jr. teaches the use of a reaction product of epichlorohydrin and bisphenol A in example 1, but does not teach the instant ratio. However, said reaction would encompass any ratio yielding the reaction product (preferably close to 100% reaction), and thus the utilization of the instant ratio would be an obvious modification since said epichlorohydrin is a mono-functional having a lower molecular weight than said bisphenol A which is di-functional.

Art Unit: 1796

Berlinghof, Jr also teaches employing an amine crosslinking system for the epoxy at col. 2, lines 39-41 and such amino resins such as melamine formaldehyde are well known and taught by Berlinghof, Jr (col. 3, lines 7-8).

Also, the instant thickness of a polymer-based bearing material would be obvious to one skilled in the art.

Furthermore, DE teaches a thickness of 5-50  $\mu\text{m}$  for a sliding layer of a bearing in English abstract. Okado et al teach a thickness of 20  $\mu\text{m}$  for a sliding layer (layer 13) of a bearing in pp [0020]. DE and Okado et al (pp [0021]) teach polyamide-imide resin. Okado et al (Fig. 1 and pp [0021]) ) also teach a multi-layer structure.

Thus, it would have been obvious silica which is one of well known fillers for sliding materials of Araki et al in Berlinghof, Jr. since utilization of a mixture of fillers is well known as taught by s to one skilled in the art at the time of invention to utilize the instant ratio of epichlorohydrin and bisphenol A in Berlinghof, Jr. since one would know using any ratio yielding the reaction product (preferably close to 100% reaction), and since said epichlorohydrin is a mono-functional having a lower molecular weight than said bisphenol A which is di-functional to utilize melamine formaldehyde as a crosslinker in Berlinghof, Jr. since Berlinghof, Jr. teaches employing an amine crosslinking system for the epoxy and since such amino resins such as melamine formaldehyde are well known, and to make sliding bearing layer having the instant thickness in Berlinghof, Jr with or without teaching of DE or Okado et al since the use of the instant thin sliding layer is well known in the art which is also evidenced by DE and Okado et al or to further utilize polyamide-imide resin of DE or Okado et al Berlinghof, Jr

Art Unit: 1796

since Berlinghof, Jr. teaches employing other thermosetting resins at col. 3, line 19 absent showing otherwise.

Claims 1, 40-44, 49-54, 56, 57, 59-63, 66, 68, 70 and 71 are rejected under 35 U.S.C. 103(a) as obvious over Berlinghof, Jr. (US 3,342,667) in view of Rey (US 4,497,764).

Claims 40 and 63 recite a mixture of two epoxy resins and a silane coupling agent over Berlinghof, Jr.

Rey teaches use of two epoxy resins in thermosetting composition in example 1 having workable viscosity since one of said two epoxy resins would be acting as a diluent and aminosilane coupling agent in table 1.

Thus, it would have been obvious to one skilled in the art at the time of invention to further utilize a mixture of epoxy resins and the art well known silane coupling agent of Rey in Berlinghof, Jr. in order to improve processing and compatibility of a matrix resin and filler since one of said two epoxy resins would be acting as a diluent and since the utilization a silane coupling agent in order to improve compatibility of the matrix resin and fillers is a routine practice in the art absent showing otherwise.

Claims 1, 40-44, 49-54, 56, 57, 59-64, 66, 68, 70 and 71 are rejected under 35 U.S.C. 103(a) as obvious over Berlinghof, Jr. (US 3,342,667) in view of Rey (US 4,497,764), and further in view of Tokunaga et al (US 5,985,455).

Claim 64 further recites different (amino)silane coupling agent over Rey.

Art Unit: 1796

However, utilization of said silane coupling in order to improve compatibility of a matrix resin and filler is well known in the art as taught by Tokunaga et al who teach various (amino)silane coupling agents at col. 5, lines 10-12 and 19-20.

Thus, it would have been obvious to one skilled in the art at the time of invention to further utilize the art well known (amino)silane coupling agent of Tokunaga et al in Berlinghof, Jr. and Rey thereof in order to improve compatibility of a matrix resin and fillers absent showing otherwise.

Claims 1, 37, 38, 41-44, 49-54, 56-62 and 66-71 are rejected under 35 U.S.C. 103(a) as obvious over Berlinghof, Jr. (US 3,342,667) in view of Araki et al (US 6,726,994).

Claim 58 further recites silica over Berlinghof, Jr.

However, utilization of various fillers and a mixture thereof in sliding materials for a bearing is well known in the art as taught by Araki et al, col. 5 in which silica is seen in line 41.

Thus, it would have been obvious to one skilled in the art at the time of invention to further silica which is one of well known fillers for sliding materials of Araki et al in Berlinghof, Jr. since utilization of a mixture of fillers is well known as taught by Berlinghof, Jr. and Araki et al absent showing the criticality of the silica.



Claims 1, 37-44, 49-54, 56-62 and 66-71 are rejected under 35 U.S.C. 103(a) as obvious over Berlinghof, Jr. (US 3,342,667) in view of Oohira et al (US 2003/0022797 A1).

The instant invention further recites silica and vinyl resin over Berlinghof, Jr. However, the utilization of epoxy resins, polyamideimide resin, vinyl ester resin and a mixture thereof in making a sliding material is well known as taught by Oohira et al, pp [0073] and pp [0059]. Silica with the surface –OH group and nano-size are taught in pp [0067].

Thus, it would have been obvious to one skilled in the art at the time of invention to utilize silica and/or a vinyl ester resin and/or polyamideimide resin of Oohira et al in Berlinghof, Jr. since both epoxy resin and vinyl ester resin are used in examples of Oohira et al and since further to employ a majority amount of polyimide in the polyamideimide since said polyimide is known thermosetting resin which would provide superior mechanical properties and since silica is one of well known fillers for sliding materials and since the use of a mixture of various fillers for improved mechanical properties and sliding properties would be obvious absent showing otherwise.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tae H. Yoon whose telephone number is (571) 272-1128. The examiner can normally be reached on Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on (571) 272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1796

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Tae H Yoon/  
Primary Examiner  
Art Unit 1796

THY/December 10, 2009